



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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June 3, 2008

Chip Hall
Project Planning Branch
U.S. Army Corps of Engineers, Nashville District
P.O. Box 1070
Nashville, Tennessee 37202-1070

SUBJECT: Draft Environmental Impact Statement for Hydropower Rehabilitations,
Dissolved Oxygen, and Minimum Flow at Wolf Creek Dam, Kentucky, and
Center Hill and Dale Hollow Dams, Tennessee; CEQ Number 20080135

Dear Mr. Hall:

The U.S. Environmental Protection Agency (EPA) has reviewed the referenced Draft Environmental Impact Statement (EIS) in accordance with its responsibilities under Section 309 of the Clean Air Act and Section 102(2)(C) of the National Environmental Policy Act (NEPA). The U.S. Army Corps of Engineers (USACE) proposes dam powerhouse rehabilitations and operational changes at the Wolf Creek, Center Hill, and Dale Hollow Dams in the Cumberland River Basin in Kentucky and Tennessee. The Wolf Creek Dam is a combination earthen fill and concrete structure approximately 5,736 feet long and 258 feet high, located on the Cumberland River near Jamestown, Kentucky. The Center Hill Dam is a combination earthen fill and concrete structure approximately 2,160 feet long and 250 feet high, located on the Caney Fork River near Lancaster, Tennessee. The Dale Hollow Dam is a concrete structure approximately 1,717 feet long and 200 feet high, located on the Obey River near Celina, Tennessee.

The currently authorized purposes for the operation of these three project developments are flood control, hydropower generation, recreation, fish and wildlife management, and water quality. The three hydropower plants covered in this Draft EIS are more than 55 years old. The dams are aging and the hydropower equipment has far exceeded the design life. The USACE is proposing to rehabilitate the equipment at these three dams. In addition, these three projects affect the water temperatures, amount of flow, and dissolved oxygen (DO) levels of up to 250 miles of the Cumberland River and its tributaries. The USACE is also proposing to modify existing structures or operating procedures to improve DO in the project tailwaters and provide minimum flows below the dams when the hydropower releases are shut off.

Six alternatives, including the no action alternative, were developed to address the three general areas of concern: aging and failing hydropower units, minimum flows for the tailwaters, and low DO in the tailwaters. To be considered acceptable, an alternative must fully address all three concerns. The preferred alternative includes: 1) rehabilitation of the hydropower units, to include installation of auto venting turbines to assist in providing adequate DO; 2) installation of orifice gates to provide well-oxygenated minimum flows; and 3) use of sluice gates and smaller

house units, on an as-needed basis, to ensure discharges in the tailwaters conform to state DO water quality criteria and supplement minimum flow releases. Finally, adaptive management is included as part of the preferred alternative to allow for changes to be made on a case-by-case basis as systems, equipment, or conditions change.

In general, EPA supports the purpose and need for the actions proposed in the Draft EIS. It is our interest to restore or increase downstream project flows to better protect aquatic life and ensure that discharges from all three project developments meet state water quality standards. Given the identification of water quality impairments in these regulated reaches, EPA supports the need for rehabilitation of hydropower units and changing operations protocols to include specific enhancement measures to increase DO concentrations and minimum flows in the tailwaters to protect aquatic life and improve water quality. However, EPA has environmental concerns related to the lack of information and specificity in the Draft EIS for several of the proposed measures and new protocols associated with rehabilitation of the hydropower units and changes in project releases. EPA offers the following specific comments for your consideration in development of the Final EIS for this project:

Water Quality Data

As mentioned above, EPA has some environmental concerns related to water quality in project dam releases. The Draft EIS identifies that discharges from all three projects, downstream of the dams, do not meet state water quality standards for DO during warmer months (summer through early fall). However, there is no specific data or information in the Draft EIS that fully describes the temporal (e.g., beginning and ending dates not meeting standards) and spatial (e.g., how far downstream) magnitude of the water quality impairment. In addition, there is no description of the current water quality monitoring protocols (e.g., parameters, frequency) that are being utilized to identify this problem (see comments on “Monitoring and Adaptive Management” below).

EPA recommends inclusion of summary tables in the Final EIS to show the monitoring and/or modeling results of various water quality parameters in the tailraces below the three dams. In addition, a summary table should be included that identifies the number and percentage of samples and days that violated state water quality standards, particularly related to DO violations in the tailraces. This information is important to include in order to determine the magnitude of violations of state water quality standards below all three dams and to devise effective strategies and operating protocols to address these impairments (see comments on “Schedule and Operations Protocol” below).

Minimum Flows

The Draft EIS identifies that project tailwaters have little or no flows for extended periods when generation stops. However, similar to lack of water quality data, the Draft EIS does not include specific data or information that fully describes the temporal (e.g., typical release schedule, seasonal differences) and spatial (e.g., differences between projects) magnitude of releases from the three project developments. The Draft EIS describes the daily generation schedule as typically following the peak demand for power, which occurs in the morning and

evening in winter, and afternoons in summer. Are operations similar during the week as on weekends with regards to project releases? What are the current minimum flows and how are they maintained? EPA recommends that the Final EIS include graphs and tables identifying monthly flow releases and stage-discharge relationships from all three projects.

In addition, the Draft EIS identifies two technical studies (Hauser 2004) that have been completed to determine the optimal minimum flows and the most practical and economic methods of achieving them. However, these studies have not been adequately summarized in the Draft EIS. For example, the Draft EIS states that the optimum minimum flows below Wolf Creek and Center Hill are 500 cubic feet per second (cfs) and 200 cfs, respectively. There is no discussion of the method that was used to determine these levels of proposed instream flows. Are these continuous minimum flows or some other rate of delivery? What target species or downstream uses were used to identify appropriate instream flows for aquatic habitat and life use support? In addition, Dale Hollow Dam was not modeled for inclusion in the Draft EIS.

Based on the above recommendations, it appears that higher, presumed continuous, releases from all three projects will be required to fully support aquatic life. EPA recommends that the Final EIS include a summary of all hydrologic modeling to demonstrate that downstream flow targets and resources needs, as well as reservoir levels, can be maintained based on the particular delivery volume and interval proposed. In addition, it appears that minimum flow releases have not been identified for Dale Hollow Dam. The Draft EIS suggests that releases from a new house unit combined with releases from the fish hatchery would provide adequate minimum flows. Other than those statements, the Draft EIS does not include any additional explanation of this process. EPA recommends that the Final EIS include the important studies mentioned above as an appendix or more thoroughly summarize the results in the text. This should be completed to fully identify the direct, indirect, and cumulative flow-related impacts from the three project developments.

The Draft EIS also is not clear on the proposed use of the house units to provide minimum flows. One section suggests that the house units would not be used for the purposes of providing minimum flows under “normal” operations. They would be used as a backup plan in the event that there is a problem with the orifice gates. However, another section they might be used as part of normal operations. The potential effects of the operation of the house turbines are not included in the Draft EIS. Where are these units situated in relation to the forebay water column? Would they discharge water with low DO or are they higher in the water column where they would discharge water with higher DO, but also higher temperatures? The Draft EIS identifies that these units need to be refurbished or replaced; however, there are no specific commitments to replace these units. EPA recommends that the Final EIS include a more detailed explanation on the proposed method of providing minimum flows for each of the three project developments, including the use of the house units. If a new house unit is proposed to provide minimum flows, EPA recommends consideration of installation of an auto venting turbine that utilizes “through-the-blade” aeration technology (e.g., installation of aerating runners) in the new unit to increase DO levels.

Water Quality Improvement Measures

The Draft EIS states that, “Hub baffles have already been installed in several of the turbines to partially address DO problems.” At what project development and which units have these been installed? To what extent are they being utilized to improve DO levels in the releases currently? The Draft EIS also suggests that sluice gates and orifice gates have been used recently at Wolf Creek and Center Hill Dams to provide minimum flows and higher DO levels. Sluicing may be considered as a measure for providing DO when generating is discharging oxygen deficient water. Recent experience has shown that one sluice gate is needed to mitigate the quality of water released by a single turbine. What are the tests and studies that have been conducted to identify the water quality benefits of these measures? EPA recommends inclusion of detailed results or other empirical evidence in the Final EIS that demonstrate the aeration capability of existing units/measures and the effectiveness of these technologies to increase DO levels in project tailwaters.

As new measures to improve water quality, the USACE proposes to undertake a series of Project modifications designed to increase DO concentrations and enhance water quality in the three Project tailwaters. The same information as described above should be provided to support the station modifications with any proposed new equipment. What types of studies/analysis has been conducted related to the effectiveness of auto venting turbines? This will be especially important to provide reasonable assurance that the proposed future operations will meet state water quality standards.

Monitoring and Adaptive Management

As mentioned above related to water quality data, the Draft EIS does not describe any existing water quality monitoring programs or summarize any existing water quality monitoring data developed for all three project developments. EPA recommends that the Final EIS include this information. With regards to monitoring, EPA is interested in establishing and/or continuing long-term water quality monitoring in the project area to determine compliance with state water quality standards. Monitoring should be utilized to determine the effectiveness of the new flow releases and other project changes, including aeration measures, on improving water quality. It is unclear from the Draft EIS if the proposed adaptive management measure will include any water quality monitoring to support such an objective.

EPA supports an overall monitoring approach that includes rigorous continuous DO and temperature monitoring below all three dams. EPA recommends including this monitoring protocol in the Final EIS. This monitoring approach will be especially important to provide reasonable assurance that the proposed future operations will meet state water quality standards. EPA also recommends that the USACE develop and implement an approved Quality Assurance Project Plan as part of an overall long-term water quality monitoring plan. This should hopefully ensure that any water quality monitoring data can be used in basinwide assessments and Total Maximum Daily Load (TMDL) development by the States of Kentucky and Tennessee. EPA would be happy to work with the USACE to help identify the appropriate locations for long-term monitoring devices.

EPA appreciates the inclusion of an adaptive management measure as part of the preferred alternative. Given the magnitude of proposed changes and number of interrelated measures, an adaptive management approach will be important to hopefully achieve the desired purpose and need for the overall project. However, the adaptive management protocol, as currently described in the Draft EIS, focuses primarily on changes to the timing and quantity of releases from the hydropower facilities, such as establishment of ramping rates and the development of publicly available release schedules.

These are important adaptive management measures, and EPA supports the consideration of these in the future. However, EPA also recommends that the adaptive management protocol include a process for making additional station modifications if the proposed improvements or operations protocols are not successful in meeting water quality standards below the dams. This would include a commitment to pursue other DO enhancement measures based on the results of the monitoring described above. Similarly, if at any time in the future, the USACE can demonstrate through studies/monitoring that DO conditions have changed for the better, it would seem appropriate to discuss with either the Kentucky Department for Environmental Protection or the Tennessee Department of Environment and Conservation the possibility of adjusting the frequency/reporting of the either the monitoring or operations protocols. This could also be included as an element of the overall the adaptive management plan.

Schedule and Operations Protocol

As stated previously, EPA supports the general approach of the preferred alternative, with an emphasis on making immediate modifications to the three project developments. The Draft EIS identifies a preferred alternative that includes some general measures for addressing the three areas of concern: aging infrastructure, low minimum flows, and low DO in project releases. However, the Draft EIS does not identify the specific measures proposed at each of the three dams or any specific timeframes for implementation of these measures. Measures for Dale Hollow Dam are only generally mentioned. The specific approach for each project development and a proposed implementation schedule should be included in the Final EIS, including the estimated capital costs of the planned refurbishments and upgrades. The USACE should also include a commitment to utilize all existing equipment modifications (e.g., hub baffles, sluice gates) to address DO problems and minimum flow releases as soon as possible.

EPA also recommends consideration of a proposed future operations protocol that takes full advantage of the aeration technology once it has been installed or is being utilized at the individual project development. Such a protocol would include the USACE operating the aerating equipment included in the auto venting turbines between May 1 and November 30 of each year, on a “first on-last off” basis to meet state water quality standards. This operating protocol should also identify the appropriate combinations of sluice gate releases with hydropower releases such that water quality standards will not be violated during generation. It is also recommended that the overall improvement schedule include contingency timeframes for making additional station modifications if the proposed improvements or operations protocols are not successful in meeting water quality standards below the dams.

We rate the Draft EIS EC-2 (Environmental Concerns-with more information requested). Enclosed is a summary of definitions for EPA ratings. EPA supports the overall proposed action and the need to rehabilitate the hydropower facilities at Wolf Creek, Center Hill and Dale Hollow Dams. We appreciate the USACE's commitment to implement these important measures and operational practices to improve and protect water quality and aquatic habitat. However, we have concerns with the lack of specificity of the preferred alternative to address water quality concerns in the project area as described in the Draft EIS. The Draft EIS does not contain sufficient information to fully assess environmental impacts of the preferred alternative. Substantial additional information has been requested for the Final EIS. EPA recommends clear identification of the improvement program and schedule, monitoring protocols, and adaptive management decision-making process in the Final EIS.

We appreciate the opportunity to review the proposed action. Please contact Ben West of my staff at (404) 562-9643 if you have any questions or want to discuss our comments further.

Sincerely,

A handwritten signature in black ink, appearing to read "Heinz Mueller", with a horizontal line extending to the right.

Heinz J. Mueller, Chief
NEPA Program Office
Office of Policy and Management

Enclosure

cc: U.S. Fish and Wildlife Service – Cookeville Field Office
Kentucky Department for Environmental Protection
Kentucky Department of Fish and Wildlife Resources
Tennessee Department of Environment and Conservation
Tennessee Wildlife Resources Agency

U.S. ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL IMPACT STATEMENT (EIS) RATING SYSTEM CRITERIA

EPA has developed a set of criteria for rating Draft EISs. The rating system provides a basis upon which EPA makes recommendations to the lead agency for improving the draft.

RATING THE ENVIRONMENTAL IMPACT OF THE ACTION

- LO (Lack of Objections): The review has not identified any potential environmental impacts requiring substantive changes to the preferred alternative. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposed action.
- EC (Environmental Concerns): The review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact.
- EO (Environmental Objections): The review has identified significant environmental impacts that should be avoided in order to adequately protect the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). The basis for environmental objections can include situations:
 1. Where an action might violate or be inconsistent with achievement or maintenance of a national environmental standard;
 2. Where the Federal agency violates its own substantive environmental requirements that relate to EPA's areas of jurisdiction or expertise;
 3. Where there is a violation of an EPA policy declaration;
 4. Where there are no applicable standards or where applicable standards will not be violated but there is potential for significant environmental degradation that could be corrected by project modification or other feasible alternatives; or
 5. Where proceeding with the proposed action would set a precedent for future actions that collectively could result in significant environmental impacts.
- EU (Environmentally Unsatisfactory): The review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposed action must not proceed as proposed. The basis for an environmentally unsatisfactory determination consists of identification of environmentally objectionable impacts as defined above and one or more of the following conditions:
 1. The potential violation of or inconsistency with a national environmental standard is substantive and/or will occur on a long-term basis;
 2. There are no applicable standards but the severity, duration, or geographical scope of the impacts associated with the proposed action warrant special attention; or
 3. The potential environmental impacts resulting from the proposed action are of national importance because of the threat to national environmental resources or to environmental policies.

RATING THE ADEQUACY OF THE ENVIRONMENTAL IMPACT STATEMENT (EIS)

- 1 (Adequate): The Draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.
- 2 (Insufficient Information): The Draft EIS does not contain sufficient information to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the Draft EIS, which could reduce the environmental impacts of the proposal. The identified additional information, data, analyses, or discussion should be included in the Final EIS.
- 3 (Inadequate): The Draft EIS does not adequately assess the potentially significant environmental impacts of the proposal, or the reviewer has identified new, reasonably available, alternatives, that are outside of the spectrum of alternatives analyzed in the Draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. The identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. This rating indicates EPA's belief that the Draft EIS does not meet the purposes of NEPA and/or the Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised Draft EIS.